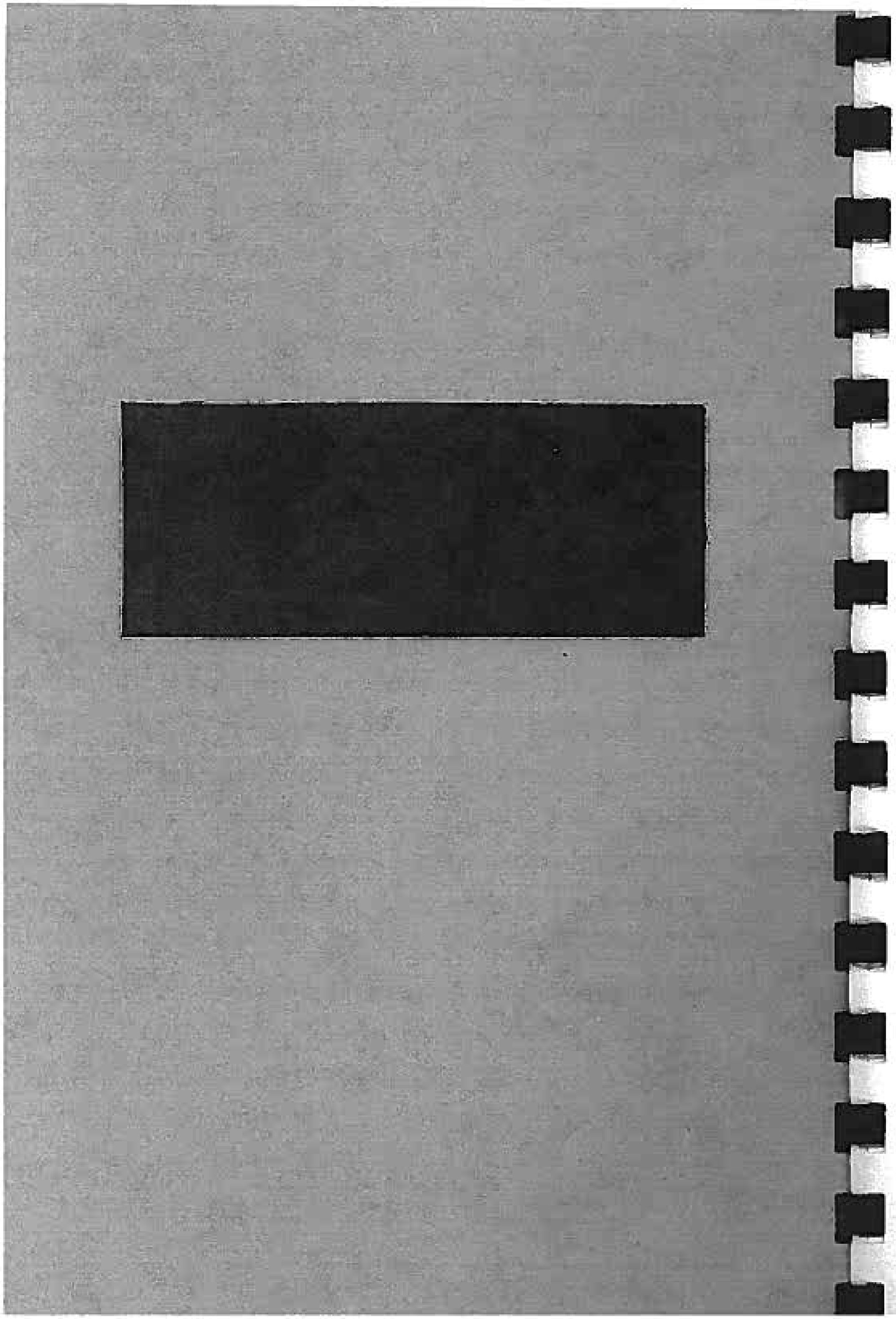


OPERATION AND MAINTENANCE MANUAL

2650 SERIES TRANSISTORIZED SURVEY METERS

nuclear-chicago
CORPORATION

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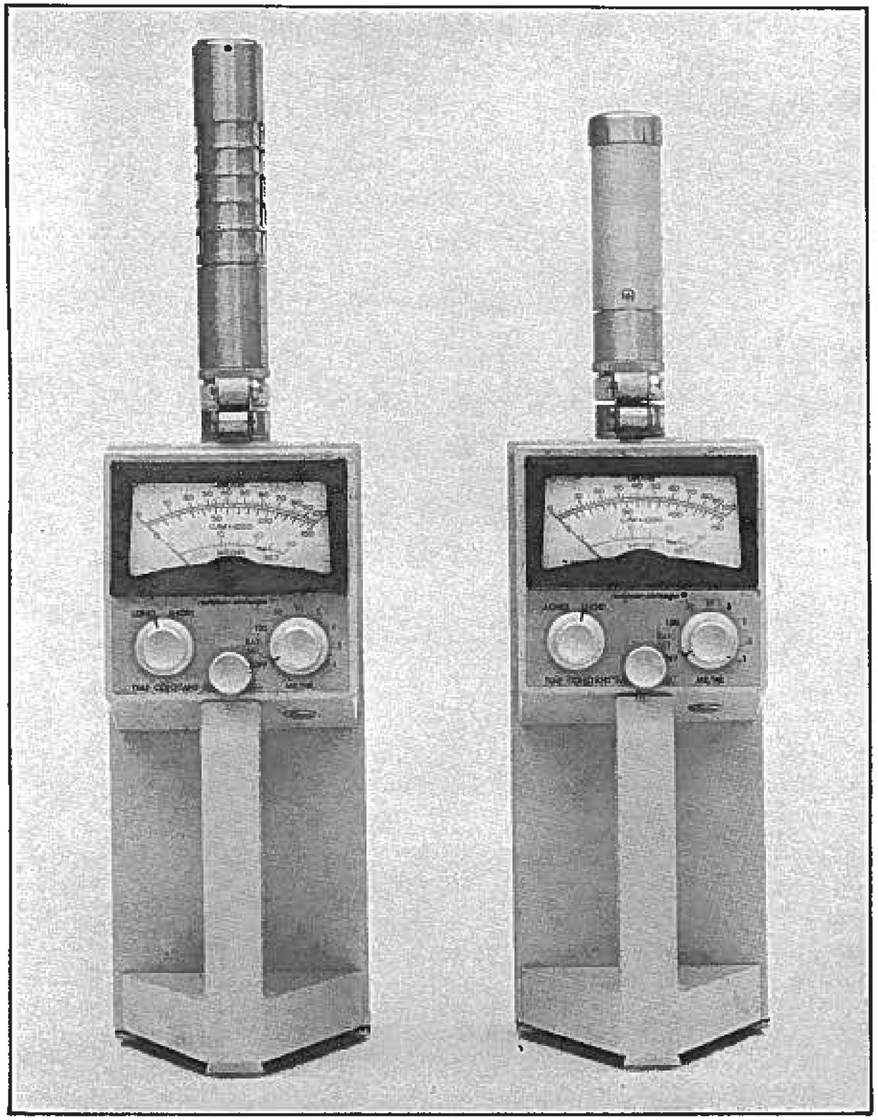


FIGURE 1 - MODELS 2651 AND 2652 TRANSISTORIZED SURVEY METERS

SECTION I
INTRODUCTION

GENERAL INFORMATION

The Nuclear-Chicago 2650 series instruments are portable battery-operated Geiger-Mueller survey meters designed to measure alpha, beta, and gamma radiation of low and medium energy. They are ideally suited for general laboratory survey work such as checking suspected contaminated areas, contamination prevention, monitoring of isotope shipments and packing material, and a wide variety of other radiological survey and health physics applications. The instruments are also ideal for general prospecting and civil defense work where varying types of radiation may be encountered.

The Model 2651 Survey Meter consists of Models 2650 basic monitoring unit and 2660 side-window probe for hard beta and gamma measurements. The Model 2652 Survey Meter incorporates Models 2650 basic monitoring unit and 2661 end-window probe for alpha, soft beta, and gamma measurements. Both probes are available separately and can easily be interchanged on the monitoring unit. The hinged swivel-type probe mount allows great versatility for making measurements in any position. The probe can be extended straight out from the instrument case or folded downward for measurements of vertical or horizontal surface areas, while at the same time maintaining the monitoring unit in a horizontal position for ease of meter reading and control operation. When not in use, the probe can be folded back against the instrument case. The probe may also be detached from the monitoring unit to permit measurements in tight areas. The $3\frac{1}{2}$ foot coiled cable which connects the probe retracts completely into the instrument case when the probe is attached to the monitoring unit.

The survey meters are entirely self contained. They incorporate long-lived, halogen quenched G-M detector tubes, along with a five-transistor monitoring and power circuit for maximum accuracy and reliability. Radiation can be measured on seven overlapping mr/hr ranges and is indicated by a $3\frac{1}{2}$ inch meter with color coded scales. An additional scale is also provided for count-rate. Selectable time constants on the most sensitive ranges allow the fastest response times consistent with good accuracy. A magnetic earphone for aural monitoring of the count rate and a low activity source for checking calibration are supplied with the monitoring unit. Both the earphone and check source are stored in a small compartment at the rear of the instrument.

All operating power for the instrument is supplied by four "D" size cells. These standard economical flashlight batteries are readily available and can be quickly and easily replaced. The detector high voltage is well regulated and circuits are also provided for checking and adjusting the power supply voltage, thus maintaining long term stability and accuracy over the full life of the batteries. The mechanical construction of the 2650 series instruments insures proper balance for hand held operation, while four plastic glide feet on the underside of the instrument case provide support on any level surface. The instrument case is constructed of lightweight aluminum and all frequently used controls are conveniently located adjacent to the indicating meter.

SPECIFICATIONS

RANGES - Milliroentgens per hour: 0.1, 0.3, 1, 3, 10, 30, and 100 full scale.
Counts per minute: 150, 1500, 15,000, and 150,000 full scale.

ACCURACY - ±10% of full scale on all ranges. Agreement between ranges is better than ±5%.

TIME CONSTANTS - 0.1, 0.3, and 1 mr/hr ranges: selectable, 4 or 8 seconds. 3 and 10 mr/hr ranges: 4 seconds, fixed. 30 and 100 mr/hr ranges: 2 seconds, fixed.

WARM-UP TIME - None.

ZERO DRIFT - Negligible.

OPERATING TEMPERATURE RANGE - $0^{o}C$ to $+50^{o}C$.

CALIBRATION - Factory calibrated with gamma rays from a cesium-137 source which is radium equivalent for this instrument.

DETECTOR TUBE TYPE - Model 2660 Probe: Side-window Geiger-Mueller. Model 2661 Probe: End-window Geiger-Mueller. Both models are halogen quenched and hermetically sealed.

DETECTOR POTENTIAL - 600 volts.

WINDOW MATERIAL - Model 2660 Probe: Stainless steel. Model 2661 Probe: Mica.

WINDOW THICKNESS - Model 2660 Probe: 30 mg/cm^2 (cathode wall). Model 2661 Probe: 1.5 to 2 mg/cm^2.

CATHODE MATERIAL - Stainless steel for both probes.

DEAD TIME - Model 2660 Probe: 100μ sec max. Model 2661 Probe: 200μ sec max.

ELECTRONIC CIRCUIT - Four-transistor monitoring circuit consisting of an emitter-coupled monostable multivibrator triggered by an emitter follower amplifier, and a buffer amplifier for the magnetic earphone. High voltage supply is a single-transistor oscillator with corona regulated output.

BATTERIES - Four 1.5 volt "D" size (standard flashlight) cells. Battery life is better than 300 hours for 8 hours per day operation.

DIMENSIONS - 5 in. high x 4 in. wide x 12 in. long with probe in retracted position. Length with probe in extended position is $16\frac{1}{4}$ in. for Model 2651 and 15 in. for Model 2652.

WEIGHT - $4\frac{1}{2}$ lbs. net including probe; shipping weight $7\frac{1}{2}$ lbs.

SECTION II
OPERATION

BEFORE OPERATING

Make a visual inspection for damage suffered in transit. The shipping container should be retained until the instrument has been checked for proper operation as covered in this section. If a Model 2661 probe is shipped, be sure to remove the beta shield and check the end window of the detector. If any damage has occurred, save the shipping container and packing material, and request an immediate inspection by the carrier. Nuclear-Chicago is not responsible for damage which occurs during shipment, but it is our practice to make every effort to help obtain restitution from the carrier. Upon receipt of the carrier's inspection report, we will arrange for repair or replacement.

Record the serial number and purchase date of your instrument in the spaces provided below:
Serial Number: ____________ Purchase Date: ____________

The check source supplied with the survey meter was calibrated with the probe which was attached to the basic monitoring unit at the time of shipment. If the monitoring unit is used with a different probe, the meter indication will not necessarily agree with the value on the source. This is especially true when changing from an end window probe to a side window probe (or visa versa), since there is a difference in sensitivity between the two types.

If the monitoring unit is to be used with both types of probes, the same check source can serve both types by following the calibration procedure described in Section III using the uncalibrated probe (after first checking the survey meter with the calibrated probe). However, instead of adjusting the CAL. control as described in the last step of the procedure, mark the source with the average mr/hr indication on the meter.

HANDLING THE PROBE

The detector probe is attached to the monitoring unit through a hinged, swivel-type mount (see Figure 2). This mount can be rotated 360° allowing the probe to be aimed in virtually any direction, yet maintaining the indicating meter and operating controls in an upright position. The probe is secured in its mount with a spring snap ring. To detach the probe from the monitoring unit, simply hold the hinged mount with one hand, and pull the probe straight out of its mount with the other hand (see Figure 3). When using the probe, do not place unnecessary strain on the coiled connecting cable, and use care when the thin end window of Model 2661 probe is exposed. The probe can be reattached to the monitoring unit by allowing the connecting cable to retract into its cell, and then snapping the probe back into the hinged mount.

INTERCHANGING PROBES

Model 2660 side window probe and Model 2661 end window probe can be interchanged as desired on any Model 2650 monitoring unit (see Figure 2). To switch probes, hold the knurled ring located near the hinged mount tightly and unscrew the probe counterclockwise (as viewed from the end of the detector tube). The MR/HR control should be at OFF when changing probes, as the high voltage is on when the control is in any other position. Although the low current capacity of the high voltage supply does not constitute a shock hazard, an accidental short circuit can permanently damage the supply.

CONTROLS

MR/HR - This nine position control selects the operation of the instrument.

OFF: At this position all batteries are switched out of the circuit and the meter is damped by a short across its terminals.

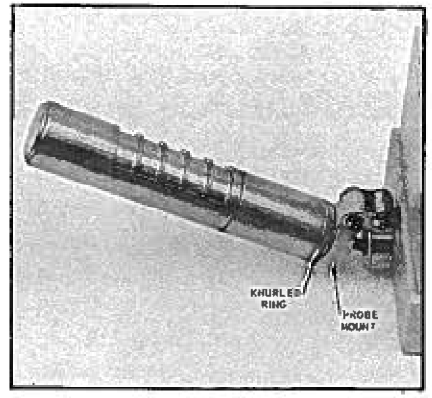


FIGURE 2
PROBE IN MOUNT

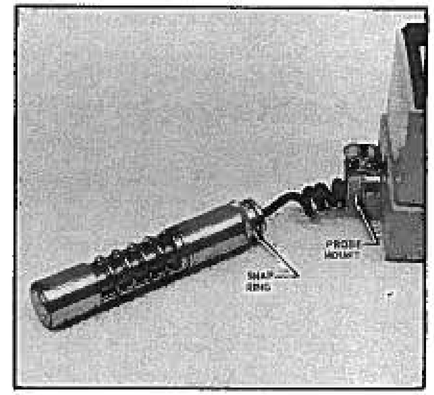


FIGURE 3
PROBE DETACHED

BAT. SET: At this position the power supply can be adjusted for optimum operating voltage with the BAT. ADJ. control.

100, 30, 10, 3, 1, .3, .1: At these positions the instrument measures radiation. The positions are actually the upper limits of the red and black MR/HR scales on the panel meter and are color coded accordingly.

Examples: (a) If the MR/HR control is set at 3, the instrument would measure radiation over a 0 to 3 mr/hr range on the red MR/HR meter scale. (b) If the MR/HR control is set at 10, the instrument would measure radiation over a 0 to 10 mr/hr range on the black MR/HR meter scale.

The black C/M × 1000 scale on the meter can be read directly when the MR/HR control is set at 100. At other settings, the scale should be reduced by an appropriate factor. Example: With the MR/HR control set at 1, the instrument would measure counts per minute over a range of 0 to 1,500.

Table I lists all possible range combinations for both mr/hr and c/m.

BAT. ADJ. - This control adjusts the power supply of the instrument to the optimum operating voltage. To adjust, set the MR/HR control at BAT. SET and rotate the BAT. ADJ. control until the meter needle rests in the green bar region on the red MR/HR meter scale. Actual operation is permissible with the meter indicating anywhere within the area of the green bar.

TIME CONSTANT - This switch selects the instrument response time-constant for the 0 to .1, 0 to .3, and 0 to 1 mr/hr ranges only. At SHORT the time constant is 4 seconds, and at LONG the time constant is 8 seconds. The time constant for the 0 to 3 and 0 to 10 mr/hr ranges is fixed at 4 seconds, and the time constant for the 0 to 30 and 0 to 100 mr/hr ranges is fixed at 2 seconds.

CAL. - This control, located under a snap-out plug on the instrument case, is for basic sensitivity calibration. Refer to Section III of this manual for complete calibration procedure.

Type of Measurement Desired	Meter Range Desired (Full Scale)	MR/HR Control Setting	Read This Meter Scale
milliroentgens per hour	0.3 mr/hr 3 mr/hr 30 mr/hr	.3 3 30	RED, MR/HR (bottom scale)
	0.1 mr/hr 1 mr/hr 10 mr/hr 100 mr/hr	.1 1 10 100	BLACK, MR/HR (top scale)
counts per minute	150 c/m 1,500 c/m 15,000 c/m 150,000 c/m	.1 1 10 100	BLACK, C/M × 1000 (center scale)

TABLE I - RANGE COMBINATIONS

PROBE SHIELDS

Model 2660 side window probe has a revolving beta shield that when closed effectively cuts out all beta radiation of isotopes such as strontium-90. This shield must be in the open position for measuring hard beta radiation, and in the closed position for measuring only gamma radiation. When the shield is open, the 30 mg/cm ^{2} window of the detector tube is exposed to 180° of angular coverage. To open or close the shield simply hold the rear section of the probe shell and rotate the front section in either direction.

Model 2661 end window probe has a removable cap which serves as a beta shield. This cap must be installed for measuring only gamma radiation. To measure alpha radiation and soft beta radiation, as from C-14 or S-35, the cap must be removed exposing the 1.5 to 2 mg/cm ^{2} mica window. When monitoring alpha or soft beta radiation it will probably be necessary to position the end window close to the source. Be sure the window does not contact the source as there is a possibility of physical damage as well as contamination of the window.

TIME CONSTANTS

Response times of 4 or 8 seconds can be selected for the 0 to .1, 0 to .3 and 0 to 1 mr/hr ranges of the instrument. The choice, however, involves several factors which should be considered before making a measurement.

When the LONG time constant is selected, the statistical accuracy of the measurement will be high but some time will be required for the meter to reach equilibrium after a change in count rate. Inversely when the SHORT time constant is used, the meter will respond quite rapidly to sudden changes in count rate, although the statistical fluctuations will be quite pronounced. The proper time constant to use, therefore, depends on the degree of

accuracy desired and the length of time that the probe will be in the vicinity of the radioactivity. When accuracy is of prime importance and sufficient time is available for obtaining the results, the LONG time constant should be selected. If, however, a fast response to a change in disintegration rate is necessary, as would be the case when localizing isotope concentrations or when there is insufficient time to obtain the measurement, the SHORT time constant is preferred.

AURAL MONITORING

A lightweight magnetic earphone is furnished with the survey meter to provide an aural indication of the count rate. This earphone is ideal for use when it is inconvenient to read the panel meter, or when it is desired to detect minute changes in count rate as in a survey for radioisotope concentrations. It is also an excellent aid for detecting sudden count rate changes of short duration while using the long time constant with the most sensitive instrument ranges.

The earphone is located in a compartment at the rear of the monitoring unit case and is connected to the instrument by a thin 3 foot flexible cable and miniature phone plug. Exercise care when using the earphone so as not to allow the spring loaded compartment door to crimp the cable. Small cutouts are provided in the door for passage of the cable. The ear-clip on the earphone is positioned for use on the right ear. To use the earphone on the left ear, gently unsnap the phone piece from the ear-clip and reinstall it from the opposite side.

OPERATING PROCEDURE

1. Set the MR/HR control at BAT. SET and allow the meter needle to reach equilibrium. Adjust the BAT. ADJ. control, if necessary, to bring the meter needle

into the green bar region on the red MR/HR meter scale. If the meter needle cannot be brought into the green bar region, the batteries must be replaced (refer to Section III).

2. If using the .1, .3 or 1 mr/hr ranges, set the TIME CONSTANT control as desired.

3. Set the MR/HR control to the proper range for the activity level to be measured. For highest accuracy of the measurement, a range that gives maximum on-scale deflection should be used. Table I covers all possible scale range combinations for the instrument.

4. Make the radiation survey so that the radiation is as near incident to the detector window as possible. Be sure the probe is used as covered under "Handling the Probe" and "Probe Shield" in this section. If the meter needle goes off scale during the measurement, simply set the MR/HR control at the next higher range.

5. When reading the meter indication, note that the two MR/HR scales are color coded to their respective range settings on the MR/HR control. The black MR/HR scale is effective only if the MR/HR control is set at .1, 1, 10, or 100, and the red MR/HR scale is effective only if the MR/HR control is set at .3, 3, or 30.

6. After completing the measurement, set the MR/HR control at OFF to prevent unnecessary battery drain.

SECTION III
MAINTENANCE

GENERAL

The Nuclear-Chicago 2650 series survey meters are thoroughly tested precision made instruments which should require very little maintenance other than normal battery replacement and occasional recalibration. If the instrument does not operate properly we recommend contacting your nearest Nuclear-Chicago service representative who will arrange complete service for the instrument. Always include the model and serial number of your instrument in any correspondence regarding the instrument. This information is on a label fastened to the underside of the instrument case.

This section will serve as a guide to locate and correct most troubles. The maintenance procedures covered in this section, other than calibration and battery replacement, must be performed by an experienced electronics technican.

CALIBRATION

The calibration of the instrument should be checked periodically to insure maximum reliability of measurements. A low activity radium check source of two different mr/hr values is included with the instrument for this purpose, and is located in the same compartment at the rear of the instrument case as are the earphones. This check source has been measured at the factory using the same monitoring unit and probe with which it was shipped, after the instrument was initially calibrated by a cesium-137 standard (radium equivalent for the instrument). The following procedures will calibrate the instrument satisfactorily with either the 2660 or 2661 probe.

1. Set the MR/HR control at BAT. SET and allow the meter needle to reach equilibrium. Adjust the BAT. ADJ. control, if necessary, to bring the meter needle to the center of the green bar region.

2. The calibration source has a low mr/hr value stamped on one side and a higher mr/hr value on the other. If the survey meter is to be used consistently to measure very low activity, calibrate with the side of the source having the lower value facing the detector window, otherwise use the higher value. When calibrating, the stamped side of the source (either value) must always face the detector window.

3. Model 2660 probe - Open the side window beta shield and place the check source against the probe at the geometrical center of the window.
   Model 2661 probe - Remove the beta shield and place the check source squarely on the window end of the probe (use care not to damage the thin window).

4. Set the MR/HR control to a range that permits maximum on-scale meter reading, and note the <u>average</u> value about which the meter needle fluctuates. If the average value is not within 5% of the value stamped on the source, adjust the CAL. control until the meter reading agrees.

BATTERY REPLACEMENT

Weak batteries are indicated when it is impossible to bring the meter needle into the green bar region on the red MR/HR meter scale using the BAT. ADJ. control with the MR/HR control set at BAT. SET. The power supply in the 2650 series instruments consists of four standard "D" size cells which can be purchased locally at any hardware or drugstore. When renewing batteries replace all four, not merely a few at a time. Replace batteries as follows, referring to Figure 4:

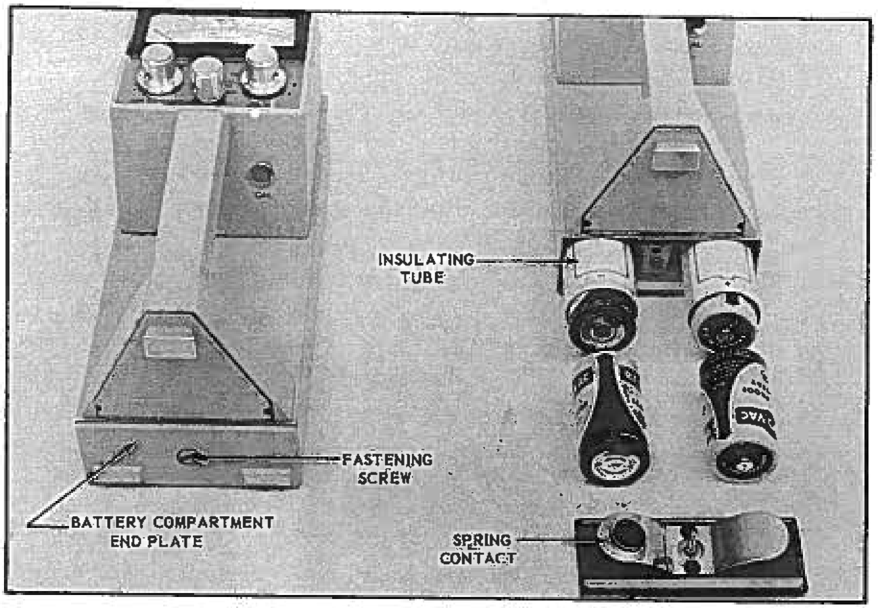


FIGURE 4 - BATTERY REPLACEMENT

1. Set the MR/HR control at OFF and remove the slotted screw fastening the battery compartment end plate to the instrument case.

2. Tilt the instrument case to slide the cells out of the compartment. If the two cardboard insulating tubes slide out, push them back into the compartment.

3. Install the four new cells, observing the correct polarity indicated by the label on the inside of the battery compartment. As viewed from the rear of the instrument case, batteries are inserted negative (-) end out on the left side and positive (+) end out on the right side.

4. Replace the battery compartment end plate and tighten slowly, being careful not to strip the screw threads. The end plate must be installed so that the spring contact with the large hole contacts the negative battery end (left side of the battery compartment).

5. Set the MR/HR control at BAT. SET, and adjust the BAT. ADJ. control until the meter needle is in the green bar region. After battery replacement it is recommended that the calibration be checked to insure maximum accuracy.

INSPECTION AND CLEANING

1. Check the end window of Model 2661 probe for small holes or cracks. Also check the stainless steel window of Model 2660 probe for dents or cracks. Blow any accumulated dust off the window with a clean air syringe.

2. Check the mechanical zero of the panel meter. Adjust if necessary by means of the slotted screw on the meter frame.

3. Unscrew the probe and clean the high voltage contacts if they appear dirty. Use pure alcohol for all cleaning operations. Be sure the MR/HR control is at OFF before unscrewing the probe.

4. Detach the probe from the hinged mount and check the entire length of the coiled cable for signs of wear. Use electrical insulating tape on any area that appears worn.

5. Check the earphone cable for kinks and knots.

6. Check the screws at the hinged probe mount to be sure they are fairly tight.

7. Check all control knobs for security of mounting. The knobs are fastened to the control shafts with two hex head set screws.

8. Remove the batteries as covered in this section and check all contacts and the inside of the battery compartment for dirt and corrosion.

ACCESS TO CHASSIS

The electronic circuit and most components of the 2650 series instruments are accessible for testing and servicing by removing the top of the instrument case as follows:

1. Set the MR/HR control at OFF and remove the batteries as covered in this section.
2. Unplug the earphone cable from its socket inside the storage compartment at the rear of the instrument case.
3. Remove the three phillips head screws from the underside of the instrument case (see Figure 5).
4. Remove the two phillips head screws and lockwashers from the inside top wall at the end of the battery compartment. An offset screwdriver will be helpful (see Figure 5).
5. Gently separate the two sections of the instrument case, being careful not to place any strain on the electrical cables which connect the two sections (see Figure 6).

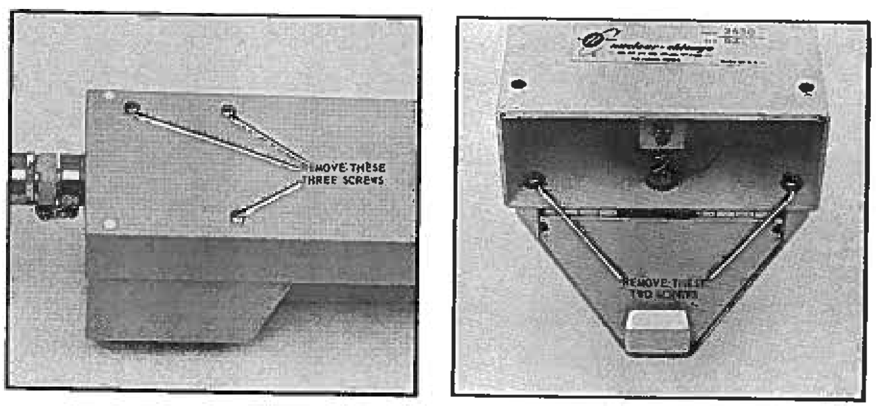


FIGURE 5 - ACCESS TO CHASSIS

6. All transistors except the power supply transistor (Q5) are located on a plug-in printed circuit board next to the MR/HR control (see Figure 6). This circuit board is keyed to its receptacle strip to prevent reversal in reassembly. The schematic designations of the transistors are marked on the foil side of the circuit board for convenience. Use exacting soldering techniques when removing and replacing the transistors.
7. Further repair of the circuit by anyone other than a Nuclear-Chicago service representative is not recommended. After repairs, reassemble the instrument in reverse order of disassembly being careful not to pinch the cables connecting the two sections of the instrument case.

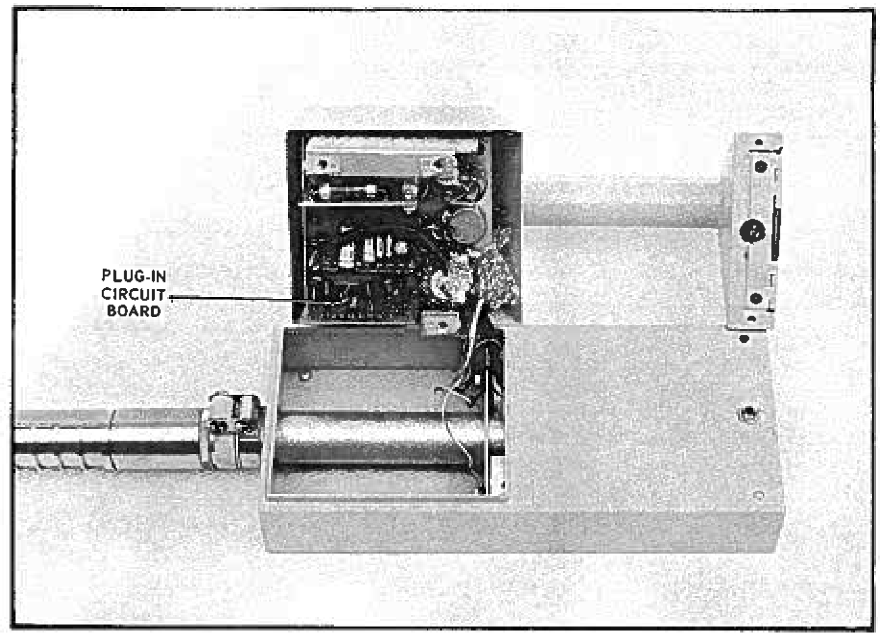


FIGURE 6 - SEPARATING CASE

TROUBLE SHOOTING

The trouble shooting guide in this section will help isolate most troubles to particular components of the instrument. If the faulty components cannot be located by using the trouble shooting guide (Table II), voltage and resistance measurements should be made as covered in this section. Repairs other than replacement of batteries, transistors, or detector tube should be performed only by a Nuclear-Chicago service representative.

TROUBLE	PROBABLE CAUSE
Instrument will not respond in a radiation field.	Defective detector tube.
	Defective Q2, Q3 or Q5.
Continuous full scale meter deflection.	Defective Q3.
No aural indication with earphones when instrument is measuring radiation.	Defective Q4.
Meter needle will not come into green-bar region using BAT. ADJ. control.	Exhausted batteries.
	Defective transistor, Q5.

TABLE II - TROUBLE SHOOTING GUIDE

DETECTOR TUBE REPLACEMENT

When the instrument does not respond in a radiation field and the electronic circuit is functioning properly, the detector tube is probably defective. Replacement detector tubes are available from Nuclear-Chicago under part number 779052 side window detector tube for Model 2660

probe and part number 779032 end window detector tube for Model 2661 probe. The detector tubes can be easily replaced as follows:

MODEL 2660 PROBE (SEE FIGURE 7)

1. Hold the knurled ring located near the hinged mount tightly and unscrew the probe counterclockwise (as viewed from the end of the probe).
2. Unscrew the slotted detector tube retaining sleeve from the inside of the probe shell.
3. Remove the rubber "O" ring and the defective detector tube.
4. Slip the new tube into the probe shell, and replace the "O" ring and retaining sleeve. Tighten the retaining sleeve until it is just snug.
5. Reinstall the probe and check the calibration of the instrument.

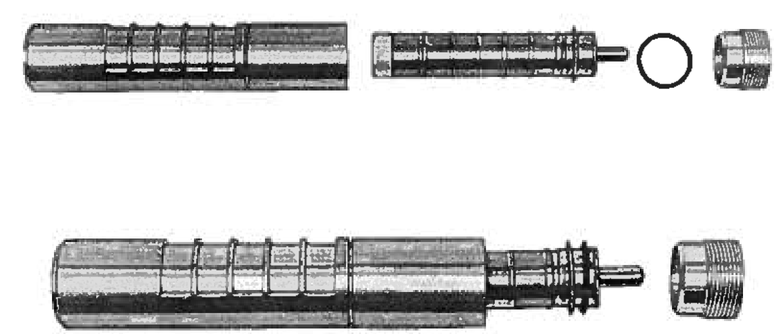


FIGURE 7 - 2660 PROBE DISASSEMBLED

MODEL 2661 PROBE (SEE FIGURE 8)

1. Remove the three small phillips head screws around the shell of the probe and gently separate the two sections of the shell by pulling the longer section away from the socket.

2. Unplug the defective tube and install the new tube.

3. Reassemble the probe shell, being sure that the two rubber "O" rings are positioned properly.

4. Check the calibration of the instrument.

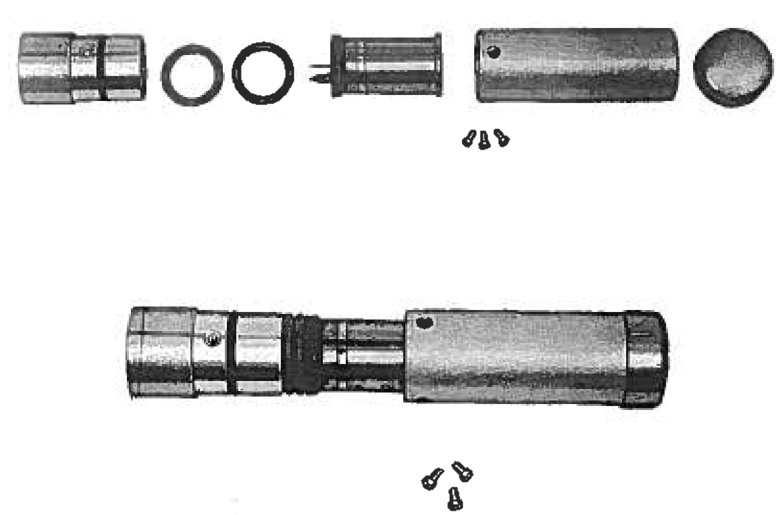


FIGURE 8 - 2661 PROBE DISASSEMBLED

VOLTAGE AND RESISTANCE CHECKS

The schematic diagram (Figure 9) lists all important resistance values and voltages. All resistance measurements must be made with the batteries removed.

REPLACEMENT PARTS

Nuclear-Chicago can supply all replacement parts for the survey meter. When ordering parts from Nuclear-Chicago, always include the model and serial number of the instrument in which they are used. The replacement parts list (Table III) gives the schematic designations and Nuclear-Chicago part numbers for the more specialized components used in the instrument. All parts ordered from Nuclear-Chicago should be ordered by their part number. Carbon resistors can be ordered by their resistance value, wattage, and tolerance. If the part number is not known, give the schematic designation number and a full description of the part.

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Schematic Designation	Description	Nuclear-Chicago Part Number
BA1, BA2 BA3, BA4	Cell, "D" size, $1\frac{1}{2}$ volt (4 required)	690170
CR1	Diode, (HB2)	600010
CR2	Rectifier (ED1SR45HPS)	610220
M1	Meter, 200µa full scale	606922
Q1, Q4	Transistor (GE No. 4JX2A622)	590150
Q2, Q3	Transistor (GE No. 4JX-634)	590160
Q5	Transistor (2N2374)	590310
R23	Thermistor (Globar No. 479H-8	353080
T1	Transformer	640470
V1	Voltage Regulator Tube (GV3B-600)	581040
	Knob, MR/HR and TIME CONSTANT controls	488511
	Knob, BAT. ADJ. control	488501
	Earphone	670830
	Detector Tube, for Model 2660 probe	779052
	Detector Tube, for Model 2661 probe	779032
	Shield Cap, for Model 2661 probe	560721

TABLE III - REPLACEMENT PARTS LIST

Schematic Designation	Description	Nuclear-Chicago Part Number
BA1, BA2 BA3, BA4	Cell, "D" size, $1\frac{1}{2}$ volt (4 required)	690170
CR1	Diode, (HB2)	600010
CR2	Rectifier (ED1SR45HPS)	610220
M1	Meter, 200μa full scale	606922
Q1, Q4	Transistor (GE No. 4JX2A622)	590150
Q2, Q3	Transistor (GE No. 4JX-634)	590160
Q5	Transistor (2N2374)	590310
R23	Thermistor (Globar No. 479H-8	353080
T1	Transformer	640470
V1	Voltage Regulator Tube (GV3B-600)	581040
	Knob, MR/HR and TIME CONSTANT controls	488511
	Knob, BAT. ADJ. control	488501
	Earphone	670830
	Detector Tube, for Model 2660 probe	779052
	Detector Tube, for Model 2661 probe	779032
	Shield Cap, for Model 2661 probe	560721

TABLE III - REPLACEMENT PARTS LIST

WARRANTY

Nuclear-Chicago Corporation warrants these instruments to be free from defects in workmanship or materials under normal use for a period of one year from date of shipment. If any part, with the exception of transistors, gas-filled detector tubes, or batteries, proves to be defective during the warranty period, it will be repaired or replaced without charge. Gas-filled detector tubes are warranted for 90 days while transistors are warranted for 30 days. No liability shall attach to us, however, for damages or delays caused by defects beyond making such repairs or furnishing duplicate parts, nor shall we be liable for any defective material repaired or replaced without our consent. All repairs or replacements are f.o.b. company's branch office, factory, or authorized service representative.

SERVICE INFORMATION

Maintenance is performed throughout the country at service headquarters in each branch office by factory trained and equipped Nuclear-Chicago personnel. Each branch office is further aided by a network of authorized service representatives who offer immediate assistance. Our nearest branch office will be pleased to provide information concerning the maintenance of your Nuclear-Chicago equipment.

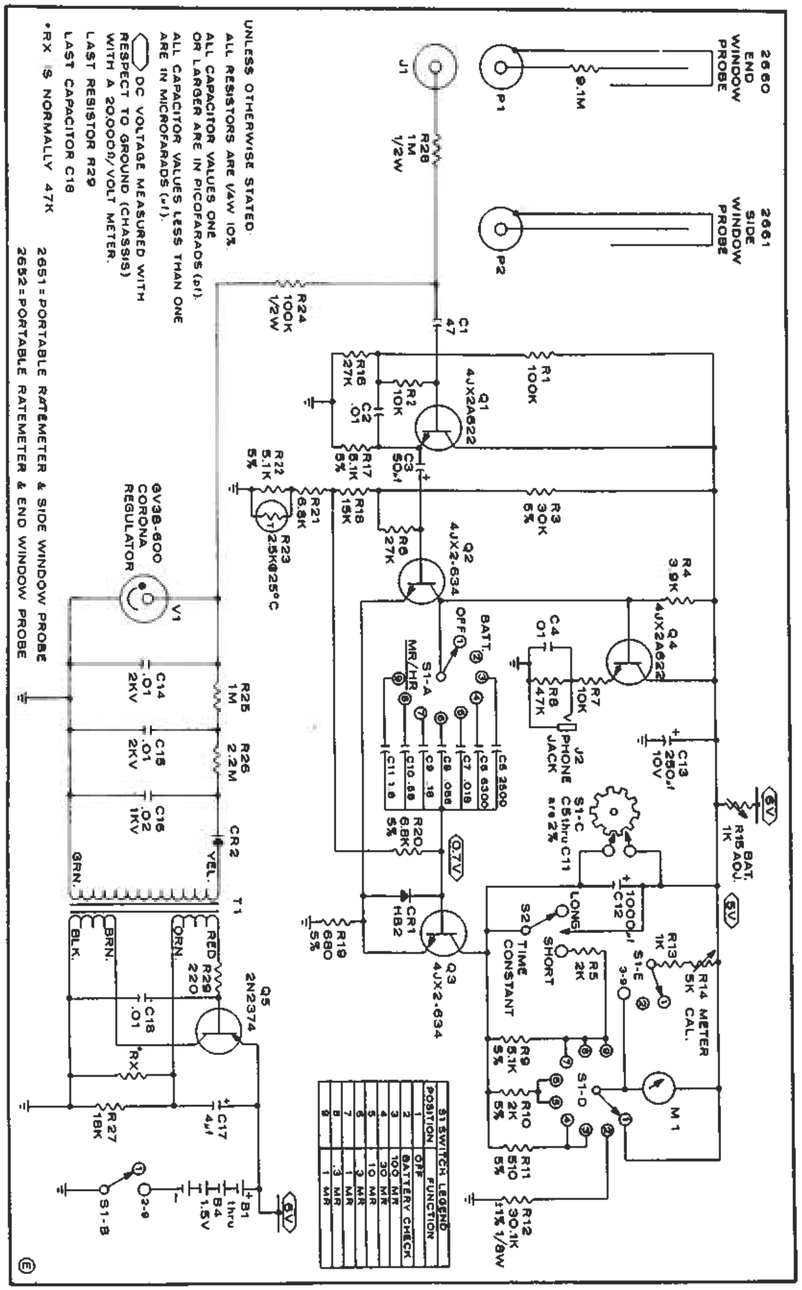


FIGURE 9 - SCHEMATIC DIAGRAM

For immediate assistance, write or phone one of these offices.

SALES OFFICES

NEW YORK
3036 East Tremont Avenue
New York 61, New York
N.Y. Phone: 212—828-3900
Rochester Phone: 716—244-4454

BOSTON
751 Main Street
Waltham 54, Massachusetts
Waltham Phone: 617—894-7733

WASHINGTON
912 Thayer Avenue
Silver Spring, Maryland
Silver Spring Phone: 301—588-2862
Baltimore Phone: 301—369-2862

PHILADELPHIA
215 North Black Horse Pike
Mt. Ephraim, New Jersey
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